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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,864	06/08/2006	Vladimir Kouznetsov	5333-3	1940

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EXAMINER	
BAND, MICHAEL A	
ART UNIT	PAPER NUMBER
1795	

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05/11/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/563,864	KOUZNETSOV, VLADIMIR	
	Examiner	Art Unit	
	MICHAEL BAND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 18-51* is/are pending in the application.

4a) Of the above claim(s) *18-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 35-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 40 and 49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 40 and 49 recite the limitation "the magnitude of a magnetron discharge". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 35-38, 40-41, 43-46, and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saigal et al (USPGPub 2004/0112735) in view of Wang et al (US Patent No. 6,413,382).

With respect to claims 1, 3-5, 41, 43, and 50, Saigal et al discloses pulsed magnetron for sputter deposition for depositing metal (abstract; fig. 7), where fig. 5 depicts a vacuum chamber [142], a sputter (i.e. argon) gas [314], a reactive gas [343],

and a chamber shield [166] that acts as an anode (p. 3, para 0037). Fig. 6 depicts pulsed discharges at a source [200] between first electrodes comprising a target (i.e. cathode) [146] and the anode [166], with a pulsing RF potential comprising a pulsed current also applied to second electrodes comprising a work piece (i.e. wafer) [148] and the anode [166] (p. 4, para 0046). The pulsing discharges and the RF potential are applied simultaneously (p. 4, para 0046), thus said pulsing discharges and RF potential appear with the same frequency. Saigal et al also discloses that when the pulsed discharge (i.e. DC voltage) is applied between the target [146] and the anode [166] to ignite the argon gas into a plasma, positively charged argon ions strike said target [146] causing atoms or atomic clusters (i.e. blobs) to be sputtered from said target [146] to the work piece [148] (p. 5, para 0055). Saigal et al also discloses a ratio of the duration of the pulse high interval to the duration of the duty cycle ranges from 1/2 to 1/8 (p. 4, para 0044), and thus a duty cycle is present. However Saigal et al is limited in that a specific duty cycle percentage is not suggested.

Wang et al teaches pulsed sputtering having a target that is pulsed with a duty cycle of less than 10% and preferably less than 1%, with Wang et al citing the advantage of using this particular duty cycle percentage as producing a very high plasma density where said plasma is continually excited so that no ignition is required for each pulse (abstract).

It would have been obvious to one of ordinary skill in the art to use a pulse duty cycle of less than 10% and preferably less than 1% as taught by Wang et al for the pulsed discharges of Saigal et al; to gain the advantages of producing a very high

plasma density where said plasma is continually excited so that no ignition is required for each pulse.

With respect to claim 2, Saigal et al further discloses the anode [166] builds up deposited material (i.e. plasma of Ar and reactive gas with metal) during sputtering (p. 5, para 0050), with a DC component on said anode [166] in addition to the RF potential bias on the wafer [148] (p. 4, para 0038 and 0046).

With respect to claim 35 and 44, modified Saigal et al discloses in fig. 6 the pulsed discharges from a first high current pulse supply (i.e. source) [200] with a pulsing bias of RF from a second high current pulse supply, with said source [200] supplying power, and thus current, at a high level of 5 kW and said second high current pulse supply at 5 kW (p. 4, para 0038; p. 5, para 0047).

With respect to claims 36, 38, 45, and 48, modified Saigal et al further discloses the target [146] negatively biased via source [200] (p. 4, para 0038), where the work piece [148] is negatively biased by another DC source (p. 4, para 0046).

With respect to claims 37 and 46, modified Saigal et al further discloses the frequency of the pulsing RF potential may be 13.56 MHz, but also states that other frequencies are suitable depending upon the particular application (p. 5, para 0047), with radio frequency (RF) having a range between 3 kHz and 300 GHz.

With respect to claims 40 and 49, modified Saigal et al further discloses the pulsed discharge at 5 kW, with the biasing pulses also at 5 kW (p. 4, para 0038; p. 5, para 0047), thus a magnitude of said biasing pulses is 100% of said pulsed discharges.

5. Claims 39, 42, 47, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saigal et al (USPGPub 2004/0112735) and Wang et al (US Patent No. 6,413,382) as applied to claims 1 and 43 above, and further in view of Mimura et al (JP No. 07150348).

With respect to claims 39, 42, 47, and 51, the references are cited as discussed for claims 1 and 43. However modified Saigal et al is limited in that while a DC bias is provided, it is not suggested for the DC power to be generated via pulse generator with a capacitor.

Mimura et al teaches a DC power source for sputtering for generating pulses of DC power through a capacitor, with the advantage gained as preventing the generation of electric arcs or abnormal discharge (abstract).

It would have been obvious to one of ordinary skill in the art to use the pulsed DC generator with capacitor taught by Mimura et al for the DC bias of modified Saigal et al to gain the advantage of preventing the generation of electric arcs or abnormal discharge.

Response to Arguments

Drawings

6. The Applicant has cancelled the objected subject matter; the objection is moot

112 Rejections

7. The Applicant has cancelled the rejected subject matter; the previous rejections are moot.

102 Rejections

8. Applicant's arguments with respect to claims 1-5 and 35-51 have been considered but are moot in view of the new ground(s) of rejection due to the new limitation requiring pulsed discharges with a duty cycle of $1*10^{-7}$% to 10%.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 9am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795